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AGRICULTURAL NEWS LETTER

VOL. 6 - NOS. 6 AND 7 JUNE—JULY, 1938

This publication gives information on new developments of interest to agriculture on laboratory and field investigations of the du Pont Company and its subsidiary companies.

In addition to reporting results of the investigations of the Company and its subsidiaries, published reports and direct contributions of investigators of agricultural experiment stations and other institutions are given dealing with the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

Vol. 6 - Nos. 6 and 7 June-July, 1938.

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This issue contains:

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AN IMPORTANT ANNOUNCEMENT TO READERS

After due consideration it has been decided to discontinue the issuing of the AGRICULTURAL NEWS LETTER during Summer months. This, the June-July number, will be followed by the August-September number, which will be mailed to readers about September 1.

An important reason for adopting this new policy is that in other years a number of those on the regular mailing list have advised us that they had not received July and August numbers. This, probably, was because these readers, like many others, were engaged in field work and did not have time to give the publication attention or copies were sent to the readers while on vacation from their teaching or other duties.

The comments of readers will be appreciated, in order that we may be in position to decide whether to continue the policy in the future.

Agricultural News Letter (du Pont)
Vol. 6, Nos. 6 and 7, June-July, 1938

METHODS FOR SPREADING WATER FOR STORAGE UNDERGROUND DEVELOPED BY THE BUREAU OF AGRICULTURAL ENGINEERING

EDITOR'S NOTE:- This informative article will serve to emphasize the growing importance of agricultural engineering to farm-land improvement and conservation. Measurably, this development takes a deserved place with other forms of irrigation as a means for promoting agricultural production. Grateful acknowledgment is made to Mr. C. E. Gapen, Chief of the Editorial and Information Division of the Bureau for his cooperation in making this discussion available to our readers.

By A. T. Mitchelson and Dean C. Muckel,
Bureau of Agricultural Engineering,
United States Department of Agriculture.

Since water-spreading is one method of conserving surface stream flow, it will be necessary to outline but very briefly the need for spreading of water in those regions where recent years of scant precipitation or heavy over-draft have resulted in the general lowering of the water table. A very large percentage of the local water supply in the South Coastal Basin of California which includes parts of Los Angeles, Riverside, Orange and San Bernardino Counties, is derived by pumping from underground reservoirs, created by nature. These reservoirs, filled with alluvial porous material tend to regulate the water supply derived from erratic precipitations by accumulating the water of wet years. They are replenished by rain falling directly on the valley floors, seepage from streams traversing the valleys, flood water discharging over alluvial fans, and return water from irrigation. The natural methods of replenishment have been curtailed considerably with the development of the country. Flood channels which previously meandered across the valleys have been narrowed and confined to the smallest possible areas. These curtailments, together with an increased demand for water resulting from additional lands being brought under irrigation and an ever increasing population, have resulted in a general lowering of the water table throughout the area.

To augment the natural methods of replenishment by artificial means, water-spreading grounds have been developed to encourage the percolation of surface stream flow. Lands ideal for spreading purposes are found immediately below the mouths of the canyons where streams leave the mountains. Large porous debris cones have been formed by floods rushing down the steep slopes. The surface areas of these cones vary from a few acres to more than 5,000 acres, depending on the size of the stream. In most cases such areas would be wasted if they were not utilized for spreading, the rocks and boulders being of sufficient size to make the land unfit for agricultural use.

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During the past few years there has been much development of spreading areas in southern California through the aid of Federal and local relief agencies, and there is now at least some form of spreading system on nearly every stream in the South Coastal Basin. One of the largest systems is on the Upper Santa Ana River debris cone where a Water Conservation Association has set aside nearly 3,000 acres for spreading purposes, a very large part of which can be wetted by the existing spreading works.

Investigations Cover Eight Years

Unlike a surface reservoir, the actual capacity of a spreading system is not a constant or definitely known quantity because of the variation in percolation rate. Since the winter of 1929-30 the United States Bureau of Agricultural Engineering has conducted investigations to determine the most efficient methods of spreading and the various factors influencing the rate of percolation on water-spreading areas. These investigations were made on experimental plots under complete control and on areas where spreading is done on a large scale and under practical conditions. The tests show that the daily rate of percolation may vary considerably throughout a spreading period, although the seasonal or long-time average for the several methods of spreading was found to be consistent. Daily rates on the same experimental plot were found to vary from about 2.00 to 9.5 acre-feet per acre during the same period of spreading; in other words the capacity of a spreading system might be approximately four times as great on one day as on another. The results of these investigations have been published in U. S. D. A. Technical Bulletin No. 578 "Spreading Water for Storage Underground."

One of the greatest difficulties in utilizing a water-spreading system for handling flood flows is the diversion works. The diversion of even small flows is complicated because of the unstable condition of the stream beds across the debris cones. These cones are still in the process of formation and each storm brings down varying amounts of silt, sand, gravel, and boulders. Diversion of all or part of the flood water is thus made difficult because of the debris deposited around the head works and in the diversion canals. On some cones the diversion of flood flows is further complicated by the fact that there is no well confined flood channel and the introduction of a diversion structure of sufficient size to control major floods by raising the elevation of the stream bed, may tend to throw the stream out of its natural channel.

Silt in Flows Presents a Problem

In order to spread flood water some provision must be made to handle the silt which is always present in such flows and is highly detrimental to percolation areas. Two methods have been devised for this purpose. On some spreading systems, settling basins have been constructed, through which the water must pass before being distributed to the spreading area proper. These basins may be equipped with gates leading back into the stream channel so that the accumulated silt may be flushed out periodically, or in basins not equipped with sluice gates the silt must be removed by scrapers or other tools to maintain their usefulness.

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Another method used is the ditch method of spreading. The ditches are laid out in slopes sufficient to maintain a carrying velocity throughout the system so as to prevent deposition of silt on the porous ditch bottoms. At the lower end of the spreading area a collection ditch is used to divert the excessively silt-laden water back into the natural stream channel to be carried to the ocean.

Methods of Spreading Described

There are four distinct methods of spreading: (1) The basin method, (2) the furrow or ditch method, (3) the flooding method, and (4) by the use of pits and shafts. Each of these has its advantages and disadvantages, and with the exception of the last named, each is widely used. They are often used in combination and it is not uncommon to find all four methods employed in a single spreading system. The topography of the soil surface, general slope of the land, amount of land available, condition of water (silty or clear), and stream flow characteristics are some of the factors which must be considered in the choice of method to be utilized in a spreading system.

In the basin method of spreading the water is impounded in a series of small basins formed by dikes or banks. The basins are so arranged that the entire area may be submerged during spreading. The dikes often follow the contour lines and are provided with outflow facilities so that the excess water from the basin highest in elevation will escape into the next lower basin. The outflow may occur by overtopping the dike or by passing through the dike in pipes installed for that purpose. Both methods have proved successful and their choice is dependent upon the material available for constructing the dikes. For the overtopping method, the dike must be of non-erosive material. In Southern California the so-called "sausage dam" has been used extensively. This type of dam is constructed by building walls of rocks of various sizes and binding them together with heavy hog wire to form a "rock mattress." This form of dam is seldom constructed higher than 8 feet and is not considered economical unless the rock is near at hand and no hauling required. As in other structures, the principles of hydraulics should be followed in their design and proper protection provided at the toe of the dam to prevent erosion resulting from the force of the overflow. Where rock is not available and the dikes are constructed of sand and earth, pipes are laid in the dikes to carry the outflow. The size and number of the pipes required are computed from the amount of water estimated to be available.

The height of the outflow above the ground surface is usually set so that when the basin is full and water is escaping, the water will have backed up to the toe of the dike forming the lower boundary of the next higher basin, therefore, submerging the entire ground surface between the dikes.

This method of spreading is used where the ground surface is irregular and spotted with numerous shallow gullies and ridges. The basins prevent the water from collecting in the gullies and running off without an opportunity to penetrate into the soil. Experiments and observations have shown that for this method of spreading the percolation rates decrease with continued use. The submerged ground surface tends to puddle and seal off the percolating area, which must then be broken up by harrowing or scraping.

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Therefore, spreading by basins is not recommended where the water carries an appreciable amount of silt or foreign material. In the lay-out of some of the spreading systems this condition has been overcome somewhat by installing gates at low points of the basins permitting of flushing out of the deposited silt. A disadvantage of this method of cleaning is that it may be required during a dry period and the necessary water cannot be spared for that purpose.

Furrows or Ditches Used

In the furrow or ditch method of spreading the water is passed through a series of furrows or ditches resembling somewhat an irrigation system. The ditches are shallow and flat-bottomed and spaced close together so as to expose the greatest percolating area. The slopes of the ditches are usually such that the velocity of the water will carry in suspension or as rolling bed load the silt and fine material known to be detrimental to percolating areas.

The ditch system usually follows one of three general plans: At right angles to the main diversion canal, lateral spreading ditches are extended parallel to each other at frequent intervals. Pipes or open cuts through the bank of the main feeder canal provide entrance to the laterals. Gates are installed at each entrance so as to control the amount of water entering each furrow. The ditches range from 3 to 12 feet in width. Their depth is determined by the roughness of the ground surface, and in general is not greater than that necessary to carry the water at a fairly uniform velocity over the ridges and gullies.

For each series of ditches or furrows of the system, a reception ditch is usually provided circling the lower portion of the specific spreading area, the purpose of which is to collect and divert the excess water from the spreading furrows into one main canal. It may then be redistributed in a new series of furrows, or if the limits of the spreading area have been reached, the water may then be diverted back into the main stream channel. Sufficient water being available this is recommended as good practice for streams carrying considerable silt, the theory being that the silt will be carried through the spreading system and back into the main stream channel, where periodical floods may carry it to the sea.

Or instead of diverting from the main canal to a series of small ditches, the main canal may be divided into two separate ditches, these two ditches then divided into four smaller ditches. This division is continued until water in the ditches has dwindled to mere trickles and finally disappears. At each division point, drop gates are provided so as to control the water entering each series of ditches.

Another plan is commonly called the contour ditch system. Here the water is spread through one ditch which follows approximately the contour of the ground surface. As the ditch comes to the limits of the area provided for spreading, a sharp switchback is made. Thus the ditch is made to meander back and forth across the land, gradually approaching the lower portion of the spreading area.

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No one of these methods can be recommended as having any outstanding advantage over the other, their choice being dependent upon the topography and other influencing characteristics of the land.

The ditch or furrow method is used extensively in stream beds, particularly where, because of flood hazard, no permanent works can be installed. Sand bars or islands above the normal flow line of the stream are furrowed by means of horse-or tractor-drawn plows. The water is then diverted into the furrows by temporary dikes or dams.

How the Best Result is Obtained

The ideal method of spreading is to pass the water in a thin sheet, and at slow velocity, over the land surface. On areas of gentle slopes and where the topography is not cut by large gullies and ridges these conditions can be approached more nearly by flooding than by any of the other methods. Few such areas exist, however, and often certain preparations must be made to prevent the water from collecting in small streams and running off without spreading widely over the land surface. Small ditches or embankments may be constructed to divert the water from the shallow gullies to the higher ridges, where it may spread in all directions, thereby wetting the slopes of the ridges as it again runs to the lower levels. By the generous use of these training ditches or embankments, a large part, if not all, of the area may be wetted.

Water may be supplied by a main canal entering the uppermost point of the spreading area and then released to follow the gullies and training structures. Usually, however, the use of one main ditch or perhaps several meandering over the highest ridges or circling the upper boundary may be desired. From these ditches the water may be diverted at intervals. This method gives better control over the water and in the event of the failure of a training wall or ditch, only a portion of the spreading operation will be interrupted while repairs are being made.

It has been found by experiment and by field observation that the highest percolation rates are obtained on areas on which the native vegetation and soil covering have been least disturbed. On a properly designed system of the flooding method of spreading, little if any, of the percolating area will be disturbed, the native vegetation and soil covering remaining intact.

On some lands, because of irregularities in the ground surface, it is not possible to spread water by this method; therefore, basins or furrows must be resorted to in order to confine the water to the definite area. The principles of flooding should be followed, however, even though the flooding method is recommended for all parcels of land in the area adapted to its use. The cost of preparing the land for flood spreading is much less than for any of the other methods.

Flooding has a Disadvantage

A disadvantage of the flooding method is that the water is not so easily confined as in the other methods. Suitable structures, such as an embankment or

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ditch at the boundaries of the spreading area, are often necessary to prevent damage in adjacent lands by escaping streams of uncontrolled water. As in any other system, the water should be under perfect control at all diversion points and at the entrance to the spreading grounds.

It is difficult to design a complete flooding system prior to the application of the water. The main ditches, diversion works, and control device should first be installed, then with the application of water the smaller training walls and ditches can be located and constructed to the best advantage. It is advisable to have at least one man on the grounds during spreading. The ditches and embankments should be patrolled and inspected, and often such simple adjustments as the placing of a few shovelfuls of dirt in the proper place will divert sufficient water to wet several additional acres. In this manner a well-developed spreading system may be made highly efficient at very low operating cost.

A method often used to spread water in stream channels should be also classified as flooding. Where the stream has a very wide bottom, caused by the meandering of the channel, a low dam or weir may be extended across the bed. By passing the water over the weir, it spreads out in a thin sheet over the entire stream bed and thereby increases the wetted area. Due precaution is, of course, taken so as not to create a hazard in time of flood by backing up the water or diverting it out of its normal stream bed. There are little if any operation costs in this type of spreading, other than a periodical inspection of the dam or weir.

The Use of Shafts or Pits

The fourth method of spreading is by the use of shafts or pits. While this method does not follow strictly the definition of water spreading, it serves the same purpose and is often referred to as a method of recharging the underground supply, although it is not used extensively because of its high cost and other limitations.

By this method the water, instead of being spread over the surface of the ground, is diverted into vertical shafts or pits. The shafts or pits are seldom sunk primarily for this purpose, but use is made of abandoned gravel pits, old wells, though this latter is not recommended. High rates of percolation are usually obtained, but due to the limited area involved a relatively small amount of water is sunk in this manner. Extreme care must be exercised in the choice of water supplied to the pits or wells, because a small amount of silt will soon seal the bottoms and sides to such a degree that percolation practically ceases. The character of these wells or shafts makes the possibility of ridding them of these deposits extremely costly or altogether prohibitive, and unless this is possible they may become useless.

Agricultural News Letter (du Pont)
Vol. 6, Nos. 6 and 7, June-July, 1938

AN OUTLINE OF DU PONT DEVELOPMENTS IN THE FIELD OF NITROGENOUS PRODUCTS FOR USE IN FERTILIZERS

EDITOR'S NOTE:- A typical instance of the aid of the industrial chemical industry to agriculture is described here. The occasion for Dr. Keenen's remarks was a visit by editors of important agricultural publications to the du Pont Experimental Station. *Copies of the pamphlet mentioned will be sent on request to the editor.

By F. G. Keenen, Research Chemist,
Ammonia Department,
E. I. du Pont de Nemours & Co., Inc.,
Wilmington, Delaware.

The du Pont Company became interested in nitrogen fixation processes around 1924 solely as a source of nitrogen for chemical operations. By 1928 through continued engineering and chemical research the cost of the primary product--anhydrous ammonia--was sufficiently reduced to warrant its application to fertilizer manufacture. The du Pont Company believes, after considering the accumulated agronomic evidence, that there is little or no difference between the agricultural efficiency of the principal nitrogen compounds in properly formulated fertilizers and chose to continue development in the direction of the lowest cost fertilizer materials. The success with which this aim has been achieved was illustrated in the pamphlet distributed during the visit to the Experimental Station.*

The products which the du Pont Company sells to the fertilizer industry are anhydrous ammonia, "Urea-Ammonia Liquor" and "Uramon."

Anhydrous ammonia, although a liquefied gas with a pressure of 100-200 lbs./sq. in., was found to react instantly with superphosphate, i.e. acid phosphate. Between one and two units of nitrogen in average complete mixed fertilizer could be "fixed" in this way by spraying the anhydrous ammonia or a water solution of it into the batch mixer at a fertilizer mixing plant. This proved a very economical method of shipping, handling and processing nitrogen into a suitable fertilizer form and was widely used during 1928-1931. However, the heat generated in the phosphatic materials by this ammonia reaction caused loss of available phosphate. Extensive laboratory and factory investigations on the chemistry of this process led to a greatly improved understanding of fertilizer manufacturing chemistry but indicated also that the potential amount of low cost nitrogen obtainable by this application of anhydrous ammonia was severely limited.

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Urea Made Available to Agriculture

Attention was then turned to investigating the possibilities of dissolving a solid nitrogen compound in the liquid ammonia, thereby continuing the desirable manufacturing features of handling liquid instead of solid and yet increasing the quantity of nitrogen so obtained. After examining the characteristics of many ammonia solutions, a solution of urea known as "Urea-Ammonia Liquor" was selected. This liquor is a solution containing approximately 43% urea, 30% free or uncombined ammonia, and some water. "Urea-Ammonia Liquor" has proven far more satisfactory than anhydrous ammonia and its use has continued to increase each season.

Realization that not all the needs of the fertilizer industry were supplied by a liquid form of nitrogen has led to the production of solid urea which is marketed as a fertilizer material under the name "Uramon" and containing 42% nitrogen (51% ammonia). This highly concentrated nitrogen compound of ammonia and carbon dioxide appears ideally adapted to top-dressing and small scale mixing operations, or direct applications to the soil.

In the evaluation of any new product a technique is developed which serves to assist the consumer in his initial use of the product. The du Pont laboratories have developed tests for determining extent and causes of caking or "set" in mixed fertilizers as well as the moisture absorption or hygroscopicity characteristics of mixtures. A series of fertilizer formulas can be compared in these several tests and within a few days the manufacturer advised as to the proper and most satisfactory mixture. Although some development and research work is continually in progress, by far the larger portion of time is at present devoted to such service work.

"Uramon" is a trade-mark registered in the U. S. Patent Office by E. I. du Pont de Nemours & Company, Wilmington, Delaware.

Agricultural News Letter (du Pont)
Vol. 6, Nos. 6 and 7, June-July, 1938

THE DEVELOPMENT OF AGRICULTURAL FUNGICIDES AND THEIR TESTING IN LABORATORY AND FIELD

EDITOR'S NOTE:- This description of the steps in the development of fungicides for seed treating outlines the complete procedure. It is based on the remarks of Mr. Miles during an inspection of the Bayer-Semesan laboratory and experiment farm by editors of agricultural publications.

By Gilbert F. Miles, Director,
Research Department,
Bayer-Semesan Company, Inc.,
Wilmington, Delaware.

The Bayer-Semesan Research Laboratory at Minquadale, near Wilmington, Delaware, supplies increased facilities for the development of fungicides for the use of the American farmer. Constructed last fall, this new research unit consists essentially of a laboratory, greenhouse, work rooms, implement and storage sheds, all located conveniently in the center of a 26-acre plot of land which is used for field experimental purposes. The location is higher than most of the surrounding land, providing good drainage and incidentally a commanding view of Wilmington, Newport and other nearby communities.

The location of laboratory, greenhouse and field plots in one compact unit enables the staff to maintain a close study of the products as they pass through the various stages of their progress beginning in the laboratory.

Contrary to beliefs sometimes expressed by the uninitiated, the development of agricultural fungicides is not accomplished merely by testing one chemical after another until a satisfactory one is found. Many a worthwhile product would be lost to science and agriculture if that method were followed. Few, if any, fungicides in use today were found ready and waiting to be put to work. True it is that almost all chemicals have some power to destroy fungi; even such everyday chemicals as table salt and lime have fungicidal properties and have been used with some degree of success to control plant diseases. But just as the progressive American farmer is no longer content to sow his grain by hand and to reap it with a sickle, so he is not content with old fashioned, inefficient, time wasting methods of controlling plant diseases. Modern farmers demand modern disinfectants that provide, for example, 99.9% control of grain smut, that can be applied to seed at the rate of 100 to 500 bushels per hour, and that cost only a few cents per acre for materials and labor. To provide such products, the chemist and plant pathologist must resort usually to much modification and manipulation of the chemical under study before it can be used successfully as a fungicide.

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Laboratory Development Procedure

There is no regular routine or system by which fungicides are thus developed. Ordinarily a chemical to be studied is submitted first to laboratory examination and tests designed to evaluate its fungicidal properties; that is, to determine the extent of its power to kill fungi, fungous spores and bacteria. Comparisons are made with fungicides of known merit.

The next step is to learn how well the chemical is tolerated by seeds or plants. This work may be accomplished by laboratory germination tests or by growing treated seeds or plants in the greenhouse. To retain the maximum fungicidal power and to reduce or eliminate any tendency to injure seeds or plants, requires frequently the study of hundreds of modifications of the original product. These modifications may consist, for example, of variations in solubility, volatility or physical properties. Thus a product may remain in the laboratory and greenhouse stage for years before it is considered worthy of trial in field plots. Needless to say, most of the materials studied in these preliminary laboratory and greenhouse tests are discarded. In fact, many of them are prepared and studied merely to supply information on the problem and with no thought that they ever could be made suitable for use by agriculture.

Field Plot and Experiment Station Tests

Emerging from these intensive indoor trials, an occasional combination is deemed fit for trial in the field plots. Here the new fungicide is subjected to tests more nearly in conformity with the conditions which it is expected to meet in the hands of the farmer. Its efficacy in controlling crop diseases is carefully observed; its effect on emergence and seedling growth is noted; and its efficiency in improving stands, yields and quality of crop is measured. In short, these field plot tests are designed to provide information as to how the product will perform under actual farming conditions.

No matter how successfully a new fungicide may pass these field plot tests, it has yet to prove itself under the wide variety of conditions which it will meet when finally introduced as a new fungicide. Investigators who have been working with the product take it to widely separated sections of the country and there test it on farms and in cooperation with farmers for two or three years or longer.

As the product approaches this final stage in its development, investigators at official experiment stations are advised as fully as possible regarding the new material and its probable field of usefulness. Samples are submitted to them for testing. Hence, it is usually true that by the time a new fungicide is released to the trade agricultural authorities are already quite familiar with it and are able to give definite answers to questions from farmers in their sections. The value of this assistance and cooperation from official investigators cannot be too strongly emphasized. Their impartial opinions on proposed new fungicides serve often as a check on the enthusiasm of those responsible for the development of the new product. Suggestions and objections from this source are invaluable in pointing out necessary or advisable changes.

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Thus it is that the finished product ready for use on the farm is the result of many years of cooperative effort on the part of many workers. Its development has not been accomplished by haphazard, grab-bag methods but by a constant study devoted to the fashioning of a chemical to its intended use by man.

FACTS ABOUT USES OF DYNAMITE FOR WATER CONTROL AND SUGGESTED WAYS TO EXTEND BLASTING PRACTICES

EDITOR'S NOTE:- Readers interested in practical applications of dynamite for the purposes described and those suggested by Mr. Livingston will be given complete information on the blasting practices involved in doing the work. Requests directed to the editor will receive prompt attention.

By L. F. Livingston, Manager,
Agricultural Extension Division,
E. I. du Pont de Nemours & Co., Inc.,
Wilmington, Delaware.

Dynamite for many years has been used for a wide range of water-control purposes. Blasting has been resorted to, successfully, to dispose of surplus water by drainage, and to also conserve moisture in the soil against the time of need for growing crops.

At one time, a great deal of subsoil blasting was done in certain parts of the country to shatter the soil at a considerable depth and thereby facilitate capillary attraction to make moisture more readily available to the roots of plants.

Hardpan blasting has been practiced both for the purpose of drainage and to increase the water content of subsoil, as the condition dictated.

A great many ponds have been drained by sink-hole blasting. Other ponds and earth tanks have been created to provide storage for cattle. Numerous suggestions have been made in connection with the use of explosives for flood control and for the prevention of soil erosion. It even has been suggested that a charge of dynamite be placed 20 feet deep in the ground at 50-foot intervals over an entire section. While this may be open to objection because of cost, at the same time there is no question but that such a series of shots would very materially increase the moisture-holding capacity and retard run-off in considerable degree.

Blasting to Spread Water for Storage Underground

One of the most significant developments in years in the field of water control consists of methods worked out by the Bureau of Agricultural Engineering, United States Department of Agriculture, to provide underground moisture storage by spreading water when available to raise the water table.

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Dynamite should find important application to the work in progress on some of the extensive projects. The use of explosives for making ditches and for clean-out operations is immediately suggested. Stream correction by blasting also suggests itself.

Since the success of providing an underground supply of water depends upon getting as much water as possible into the ground, it is at once evident that ditches made by blasting would prove highly efficient, because blasting increases the porosity of soil by the vertical and the lateral force of the blast. As a matter of experience, blasting ditches for the usual irrigation purpose is undesirable because too much water is dissipated through ground absorption by reason of increased friability due to the shattering effect of the explosion. This effect, however, would operate to distinct advantage where the purpose is to distribute as widely as possible beneath the surface.

The Use of Explosives for Water Basins.

Water storage basins of any required length and of almost any desired depth and width up to 40 feet can be blasted. It will be found practicable, in some cases, to make basins, singly or in series, near the foot of a hill and at different elevations in the side, to catch and store water flowing down the incline. The location of a basin should be well enough up to permit the water to flow by gravity through pipes. Channels of sufficient dimensions should be provided, where necessary, to carry the water to distribution points for spreading through lateral ditches or furrows. Soil of the proper type would permit considerable seepage from a series of elevated basins. This seepage would contribute to raising the water table for a greater or less distance from the basins.

Obviously, considerable investigational work under the direction of competent agricultural engineers would be required to establish the value of some of the suggestions offered, therefore, distinction should be made between suggestion and recommendation.

NEW COMMERCIAL SEED TREATING PAMPHLET

The second edition of the pamphlet, "Commercial Seed Treating" is now available to custom treating operators, elevators, seedsmen, and others engaged in the large-scale treatment of seeds with dust disinfectants.

The many requests from all over the country for the previous edition showed the wide-spread interest in commercial seed treatment. In preparing the revised publication, the Bayer-Semesan Company has attempted to give the latest information available on dust disinfectants, location and housing of the treater, labeling and storing treated seed, mechanical equipment, and the elimination of excess dust.

The pamphlet contains cuts and descriptions of the latest model seed treating machines, prepared by the manufacturers of this equipment. Also included are pictures of several of the dust masks approved by the United States Bureau of Mines.

Of particular interest to large-scale operators is a newly-designed dust collector for reducing flying dust during sacking. Complete plans are shown for a down-draft device which in several installations has reduced to a minimum the excess dust in sacking. This arrangement will help make the treating operation much safer for workmen.

Those interested in commercial seed treatment may secure a copy without charge by writing to the Bayer-Semesan Company, Du Pont Building, Wilmington, Delaware.

PORTO RICAN AND MEXICAN PUBLICATIONS ACKNOWLEDGED

The Agricultural News Letter acknowledges the receipt of the very splendid number of the Revista de Agricultura de Puerto Rico for March, 1938. This handsome issue is beautifully illustrated with photographs in color of certain birds of prey found in Puerto Rico. The publication also carries numbers of highly interesting articles regarding agriculture and allied subjects.

The Agricultural News Letter wishes to acknowledge the receipt of the Boletin del Departamento Forestal y de Caza y Pesca, of the Republic of Mexico for February, 1938. This is the official organ of the Forestry Department of Mexico which is doing such important work for that country and which is cooperating in such a splendid degree in the matter of game restoration and game protection with the organizations and societies of the United States which are also engaged in the same work.

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Agricultural News Letter (Du Pont)
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NEW SYNTHETIC FLYSPRAY BASE TO REPLACE PYRETHINS IN SUBSTANTIAL PROPORTION FOR USE IN INSECTICIDES

EDITOR'S NOTE: - This development is expected to in large measure relieve manufacturers of household insecticides of dependence upon the uncertainties of the supply of pyrethum from the Far East and other foreign sources from which this base for flysprays has been imported. Information as to where the product may be obtained will be supplied on request to the editor.

A new synthetic flyspray base capable of replacing a substantial proportion of the pyrethrins now used in household insecticides has been announced by E. I. du Pont de Nemours & Company. This compound, known as isobutyl undecylenamide, an alcohol derivative combined with a vegetable oil derivative, was developed in the du Pont laboratories from research undertaken at the request of the insecticide trade, because of the increasing difficulty of getting a uniform and reliable source of pyrethrum for the ever-growing flyspray market.

Attempts to cultivate pyrethrum in the United States have been unsuccessful because this country cannot compete with cheap foreign labor in harvesting the flower heads. Accordingly the pyrethrum used in this country is imported, largely from the Far East, Africa and Central Europe. The crop varies widely from year to year in both quality and quantity. The facts that there is little authentic information available on the crop until after the harvest, and that American importers must buy it sight unseen, have given rise to an uncertain market and a great deal of speculation. The present Sino-Japanese conflict has caused even more uncertainty. This situation prompted the research by which isobutyl undecylenamide was developed.

Thoroughly Tested for Safety in Use

The introduction of isobutyl undecylenamide as an improved ingredient for flyspray is significant in that not only has it been tested and proven as a compound extremely efficacious in the field for which it is intended but it has also been carefully investigated for its possible poisonous effects upon those who may use it. The results of this toxicological investigation have shown that the compound is safe for use as a flyspray without fear of injurious effects to persons or household pets.

The experimental work on the possible physiological effects of this new compound on animal life was conducted at the Haskell Laboratory of Industrial

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Toxicology of the du Pont Company and the modes of administration were by mouth, subcutaneous injection, inhalation of mist and application to the skin.

Administration by mouth experiments were done on rats, the animals being fed various sized doses from .5 to 10 cc. per kilo body weight. The minimal fatal dose killing 70% of the animals in 20 to 90 minutes was 4 cc. per kilo body weight, indicating a relatively low toxicity.

A second group of rats were fed 2 cc. of isobutyl undecylenamide every second day for a period of six weeks. None of these animals showed toxic symptoms and all gained weight during the experiment.

Subcutaneous injections of 1.15 to 7.27 cc. per kilo body weight, using rats and mice, gave no evidence of toxic action.

In order to determine whether or not isobutyl undecylenamide is liable to produce irritation to the skin, 1 cc. was applied daily to the shaven backs of white rats five times a week for seven weeks. None of these animals showed any skin irritation and the hair continued to grow at the site of application.

Tests Show No Lung Irritation

The inhalation experiments were done to determine whether isobutyl undecylenamide would produce lung irritation or any remote effects as the result of absorption through the respiratory tract. Rabbits were subjected to the mist of isobutyl undecylenamide for one and one-half hours a day up to 15 days. This mode of administration did not result in lung irritation or any other toxic effects. All experimental animals were subjected to gross and microscopic pathological examinations.

The inhalation and skin application experiments represent the conditions under which the user will be subjected to the normal exposures to isobutyl undecylenamide. Inasmuch as the compound shows no toxic effects upon animals under conditions which are extreme, it is safe to assume that under normal conditions the human will not be affected by any untoward symptoms either from skin irritation, nasal or lung irritation or toxic effects as the result of absorption.

The above data indicate that isobutyl undecylenamide meets one of the foremost requirements of a flyspray ingredient: namely, that it can be placed in the hands of the public with assurance that it may be used for the purpose for which it is recommended with safety and no untoward effects upon body health. Other less vital but important characteristics of a flyspray base, such as lack of objectionable odor and of staining fabrics and wallpaper, have been checked in the du Pont and outside laboratories and found satisfactory in the case of isobutyl undecylenamide.

Until now no substance has been found which is as satisfactory as pyrethrum from the viewpoints of efficiency, safety to humans, and the other requirements of a flyspray ingredient. Isobutyl undecylenamide provides a domestic source for a potential substitute.

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